Chapter 3

Parent Care and Middle-Aged Women's Employment

Abstract Does parent care influence Chinese women's participation in work? Using the longitudinal data of the China Health and Retirement Longitudinal Survey (CHARLS) from 2011 to 2015, this study investigates the influence of parent care giving on probability of work participation of women aged 45–69 in China. The random-effects model and the instrumental variables (IV) method are used to address the unobserved heterogeneity and other endogeneity problems. Although the results in previous studies that used younger and middle-aged women (i.e., women aged 18–52) indicate that parent care negatively affects women's labor supply, the results indicate that the probability of work participation is higher for the care-giving group. This can be explained by the fact that the positive effect (obtaining income effect) is higher than the negative effect (time-constraint effect). We also found that the influences of caring for parents on women's work participation differ by age and education group.

Keywords Parent care · Work participation · Middle-aged women · China

3.1 Introduction

As is well known, the main givers of family care—including parent care—are women. According to family economics (Becker 1985), the prospect for work in the labor market is higher for men, while the prospect of housework is higher for women; therefore, based on the individual and household utility maximum model, most women assume responsibility for the family, while most men work in the labor market. Therefore, parent care may affect the women's employment. Some previous studies for developed countries found that caring for parents may decrease the women's employment. Family care work—including parent care—has been noticed in the world as a kind of unpaid household work. For example, the Beijing Platform for Action, adopted at the 1995 United Nations 4th World Conference on Women, called for member nations to take measures to recognize the value of unpaid family care work, reduce its burden, and encourage a more equitable distribution of unpaid family

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care work within the household (United Nations 1996). Goal 5 of the 2030 Sustainable Development Goals (SDGs) includes a target for recognizing and valuing unpaid family care work (United Nations 2015). Therefore, investigating the impact of parent care on women's employment has become an important issue for both developed and developing countries.

Chinese society has become an aging population and is facing the problem of a decreasing labor force; thus, increasing labor force participation has become an important issue for the Chinese government. This study investigates the influence of caring for parents on women's employment in China. Although some previous studies have analyzed the influences of child care on women's employment¹ and discussed unpaid work in China,² empirical studies on the impact of caring for parents on middle-aged women's employment are scarce. This study can address this neglected problem and provide new evidence on the issue from China.

The remainder of this chapter is as follows. Section 3.2 introduces the channels of the influence of parent care giving on the employment and summarizes previous empirical studies on the issue. Section 3.3 gives the framework of the empirical analysis, including models and datasets. Section 3.4 introduces the determinants of parent care giving and the influences of parent care on middle-aged women's employment. Section 3.5 summarizes the conclusions.

3.2 Literature Review

According to the economic theories, parent care may have both negative and positive effects on employment. First, based on the individual utility maximum model, an individual's labor supply is determined by the market wage and the work-leisure preference (e.g., reservation wage). Parent care can be considered a part of reservation wage that may increase the preference for leisure (non-work). Because a trade-off relationship between parent care and working hours remains, when a woman has to exit the labor market or reduce the working hours to care for parents even though she prefers to work, parent care may negatively affect her employment (negative effect). However, when a woman can pay for parent care service from the market, she may also choose to work, whereby she can earn more so as to pay for parent-care services or to charge care expenditures (positive effect). Because both the negative and positive effects remain, it is not clear how caring for parents affects the labor supply of middle-aged women. Empirical studies should be employed to investigate the relationship between parent care and middle-aged women's employment.

Second, numerous empirical studies for developed countries indicate that providing family care—including child care and parent care—reduces women's labor supply (Robar 1992; Lehrer 1992; Michalopoulos et al. 1992; Wolf and Soldo 1994; Çağatay et al. 1995; Wolf et al. 1997; Angrist and Evans 1998; Pezzin and Schone 1998; Carmichael and Charles 2003; Lilly et al. 2007; Leigh 2010; Viitanen 2010; Givord and Marbot 2015; Ho 2015; Skira 2015; Leken et al. 2017; Gathmann and Sass 2018).

Particularly, the influence of parent care giving on women's employment since the 1980s has been researched (Soldo and Myllyluoma 1983; Brody and Schoonover 1986). Lilly et al. (2007) summarized 35 papers on the issue for developed countries. Recently, numerous empirical studies have been undertaken; for example, Heitmueller (2007), Heitmueller and Inglis (2007) for the UK, Lilly et al. (2010, 2011) and Jacobs et al. (2014) for Canada, Meng (2011) for Germany, Casado-Marín et al. (2011) for Spain, Schneider et al. (2013) for Austria, and Nguyen and Connelly (2014) for Australia.

Most recent previous studies consider the endogeneity problem between parent care giving and women's employment. The previous studies can be divided into three types, based on the analysis method. First, some studies use parent care giving as an exogenous variable, but the results among these studies are not consistent. For example, Carmichael and Charles (2003a) found that family care reduces the probability of work participation. Lilly et al. (2010) found that family care reduces work participation, but its influence on work hours and wage is not significant. Second, some previous studies used cross-sectional survey data and instrumental variables (IV) methods to address the endogeneity problem. For example, Ettner (1995, 1996), Heitmueller (2007), and Bolin et al. (2008) used parents' age, parents' health status, number of siblings, and living parent dummy variables as the instrumental variables. Wolf and Soldo (1994) used the instrumental variables (IV) method and the reduced function method, respectively, to address the endogeneity problem. Third, some studies used panel data analysis methods, such as the fixed effects (FE) and random effects (RE) models, to address the endogeneity problem (Casado-Marín et al. 2011). Using fixed effects and instrumental variables methods (FE + IV), Van Houtven et al. (2013) found a remaining endogenous group for women. Most previous studies found that caring for parents may reduce the women's employment (Ettner 1995; Heitmueller 2007; Bolin et al. 2008; Van Houtven et al. 2013).

For China, using the data of the 2009 CHNS and IV-probit regression models, Chen and Fan (2015, 2016) indicated that caring for parents may reduce the women's employment. Using data from the CHNS from 1991–2011 and IV methods, Chen et al. (2016) found that caring for parents may reduce both the probability of participation in work and working hours of women aged 18–52, but the influence of caring for parents on the early retirement of women aged 45–49 is not significant. Using data from the China Health and Nutrition Survey (CHNS) from 1993–2011 and IV-probit and IV-tobit regression models, Wu et al. (2017) found that parent care giving may reduce the labor supply of both women and men. The instrumental variables used in these studies are the need of parent care and the number of siblings (Chen and Fan 2015, 2016; Chen et al. 2016; Wu et al. 2017).

Although these previous studies investigated the impact of parent care on women's employment, some remaining issues should be discussed as follows. First, no empirical study has focused on middle-aged Chinese women. As is well known, the probability of becoming ill is higher for older parents; therefore, the probability of parent care giving is higher for the middle-aged group. Regarding the influence of the public pension system, a woman can choose early retirement for parent care giving, which may decrease the labor force participation of middle-aged women. Therefore, from

both economics and policy perspectives, focusing on middle-aged women is important. Second, because conditions such as time constraints and pension eligibility age differ by groups, a heterogeneity problem may remain among different groups. Therefore, sensitivity checks for different groups should be employed. Although previous studies considered differences by population registration system (*hukou*) and education groups, differences by age and income have not been analyzed.

In contrast with previous studies, the main contributions of this study can be considered to be as follows. First, using a longitudinal survey data from the China Health and Retirement Longitudinal Survey (CHARLS), which focuses on individuals age 45 and older, this study chooses women aged 45–69, who give most of the care for older parents as the analyzed objects, to investigate the influence of parent care giving on women's work participation. Second, using subsamples of different groups, this study considers group heterogeneity and compares the influence of parent care by age (women aged 45–54, 50–54, 55–59, and 60–69), *hukou* (rural or urban), education (low-, middle-, and high-level education), and household income groups (low-, middle-, and high-income levels). Third, this study uses the IV method to address the endogeneity problem, as well as the random effects (RE) model to address the heterogeneity problem. These results may provide new insight regarding the issue.

3.3 Methodology and Data

3.3.1 Model

The probit regression model can be used to investigate the probability of work participation as Eq. (3.1).

$$Pr(Y_i = 1) = a_0 + \beta_{oPC} PC_i + \beta_{oX} X_i + v_i > 0 \quad (3.1)$$

In Eq. (3.1), $Pr(Y_i = 1)$ denotes the probability of work participation. i indicates individuals, PC is the dummy variable of parent care giving, and X represents the control variables. The influence of parent care giving on women's work participation is denoted by β_{oPC} , and the effect of each control variable is denoted by β_{oX} . In addition, a is a constant, and v_i is the error term.

In Eq. (3.1), two econometric problems should be considered. First, it is argued that an endogeneity problem may remain between the labor supply and parent care giving. For example, a woman can provide parent care because she retired early to care for a parent. To address the endogeneity problem, the IV method is used and is expressed as Eqs. (3.2)–(3.5).

$$Pr(PC_i = 1) = a_1 + \beta_{1Z} Z_i + \beta_{1X} X_i + u_i \quad (3.2)$$

$$Resi_i = Pr PC_i - Pr \widehat{PC}_i \quad (3.3)$$

$$Pr(Y_i = 1) = a_2 + \beta_{2PC} \widehat{PC}_i + \beta_{2X} X_i + \varepsilon_i \quad (3.4)$$

$$Pr(Y_i = 1) = a_2 + \beta_{2PC} PC_i + \beta_{2Resi} Resi_i + \beta_{2X} X_i + \varepsilon_i \quad (3.5)$$

$$corr(Z, \varepsilon) = 0 \text{ and } corr(Z, u) \neq 0$$

In Eqs. (3.3) and (3.4), β_{2PC} could be estimated by a two-step procedure: first, estimate Eq. (3.1), then predict $\widehat{PC}$ or residual items *Resi* (Eq. 3.3) in the first step; and second, include $\widehat{PC}$ or residual items *Resi* as explanatory variables and estimate Eq. (3.3) or (3.4) in the second step. Whether the estimates are unbiased hinges critically on the validity of the instrumental variables (Z); that is, Z needs to be correlated with PC while satisfying the conditions that $corr(Z, \varepsilon) = 0$. The IV methods include the two-stage least squares (2SLS), two-stage predictor substitution (2SPS), and two-stage residual inclusion (2SRI) models. The 2SRI model was advocated first by Hausman (1978), and then it was used by Blundell and Smith (1989). Newey (1987), Rivers and Vuong (1988), and Terza et al. (2008) pointed out that the SRI model can be used in binary variable analyses, and it can be considered to be an expansion of the 2SLS model for binary variable analyses. Because the dependent variable is a binary value (0 or 1), 2SPS and 2SRI models are used in the study, which are expressed by Eqs. (3.3) and (3.4), respectively.

Second, the heterogeneity problem may remain in Eq. (3.1). Concretely, v_i in Eq. (3.1) includes the unobserved individual-specific time-invariant effect μ_i and the true error δ_{it} ($v_{it} = \mu_i + \delta_{it}$). When the unobserved individual-specific time-invariant effect is not considered, the bias may exist in the results. To address the problem, the random effects (RE) model is used; it can be expressed by Eq. (3.6):

$$Pr(Y_{it} = 1) = a_3 + \beta_{3PC} PC_{it} + \beta_{3X} X_{it} + \mu_i + \delta_{it}. \quad (3.6)$$

Finally, to address the heterogeneity and other endogeneity problems simultaneously, the random effects model and the IV-2SRI model (RE + IV) are used.

We employ the Cragg-Donald Wald test to check the weak instrumental variables problem and calculate the Sargan statistic values to check the exogenous variables; we also employ the Durbin-Wu-Hausman test to determine whether the endogeneity problem remains between labor force participation and parent care giving. Then, we determine the validity of these models based on these test results.

3.3.2 Data

Data for this study come from the China Health and Retirement Longitudinal Survey (CHARLS). The CHARLS, which is conducted by Peking University every two years, covers representative regions of China. Its survey objects are individuals aged

45 and older. The baseline national wave of CHARLS, conducted in 2012, includes approximately 10,000 households and 17,708 individuals in 150 counties/districts and 450 villages/resident committees. The first and second follow-up survey waves were for 2014 and 2016. Information such as demographic characteristics, family structure, intra-household transfer, employment status, income, and other related facts can be obtained from the CHARLS. Because information about parent care can only be obtained from CHARLS 2011 and CHARLS 2013 data, this study uses data from these two waves. To consider the influence of the retirement system in government organizations and enterprises and public pension policies, the sample is limited to women from 45–69 years of age, including both rural and urban residents. Regarding the retirement system, we also analyzed various age groups (groups aged 45–49, 50–54, 55–59, and 60 and older) to check robustness.

3.3.3 Variables

Two dependent variables are constructed as follows: first, a binary variable is equal to 1 when a woman is caring for a parent and 0 when she is not. This variable is used in the first stage of the instrumental variable method. Second, a dummy variable is equal to 1 when a woman is working and 0 when she is not working.

The main independent variable is the dummy variable of parent care giving, which is equal to 1 when a woman is a parent care giver and 0 when she is not.

Different covariates are used to control other influences on women's participation in the labor force. First, according to the human capital theory (Becker 1964; Mincer 1974), an individual's wage level is determined by human capital, such as education and years of experience. As Grossman (1972) pointed out, health status is also a kind of human capital. It can be thought that these factors are the important determinants of the labor supply. On the other hand, educational attainment may also influence people's attitudes toward work and family care. This study uses educational attainment levels (low, middle, and high educational levels),³ age dummy variables,⁴ and subjective health status⁵ as the proxy variables of human capital.

Second, Douglas (1934) and Arisawa (1956) indicated that women's labor supply is influenced not only by the market wage but also by unearned income, such as the income of the husband and other family members. Annual household consumption is used as the index of household income. The dummy variable of having a spouse is constructed to control the influence of family members on the labor supply.

Third, based on the labor market segmentation hypothesis (Piore 1970), workers' behaviors are shaped by the characteristics of the labor market. As is well known, in China, the labor market is segmented by the population registration system (*hukou*) (Ma 2018). Since 1958, the *Hukou* system has been implemented by the government. In the planned economy period (1949–1977), migration from rural to urban areas was prohibited. During the market-oriented economy reform period since the 1978, the *Hukou* system has been deregulated, but great differences in employment and wages remain between the rural *hukou* and urban *hukou* residents. For example, social

security systems (e.g., public pension, medical insurance schemes) differ according to the *Hukou* system. Therefore, an urban resident dummy variable is used to control the influence of labor market segmentation by the *hukou* system.

Fourth, two variables are constructed as instrumental variables. (1) The number of parents living can affect the probability of parent care giving; the more parents who are living, the higher the probability of parent care giving will be. (2) The number of siblings may affect the probability of parent care giving. It is assumed that the probability of parent care giving may be smaller for a woman with more siblings because parent care giving can be shared among siblings. It can be considered that the influences of these two variables on work participation of middle-aged and older women are small. The number of parents living and number of siblings are used as the instrumental variables in this study.

Finally, the culture and the economic development level may change by years; the year dummy variables (2011, 2013) are included in the control variables. Table 3.1 presents descriptive statistics of the variables of women aged 45–69. First, the proportion of women caring for a parent is 13.7%; one of seven women aged 45–69 in China care for a parent. Second, as compared with the employment rate between the care-giving and non-care-giving groups, it is generally 6.6% lower for the care-giving group than for the non-care-giving group. Third, individual characteristics differ between the care-giving group and the non-care-giving group. Concretely, it is shown that the proportions of groups that are well-educated, healthy, have a spouse, are urban residents, are younger, and have high-income households are greater for the care-giving group, whereas the number of children is slightly less for the care-giving group. The individual characteristics of care-giving and non-care-giving groups are shown to differ; these factors should be controlled when investigating the influence of parent care giving on women's employment.

3.4 Results

3.4.1 Determinants of Women's Parent Care Giving

Table 3.2 summarizes the determinants of parent care giving. The probit regression model based on the cross-sectional data (Model 1) and the random effects (RE) probit model based on the panel data are used (Model 2). The main findings are as follows.

First, in the initial stage of the IV method, the coefficients of both the number of parents living and the number of sibling dummy variables are statistically significant at 1 and 5% levels in both Model 1 and Model 2. Based on the results of Model 2, when the number of parents living increases by one, the probability of parent care giving may increase by 61.9% points; as compared with the group with four or more siblings, the probability of giving parent care may decrease by 19.1% points for the group with one sibling; however, the differences in probability between groups

Table 3.1 Descriptive statistics of variables

	Total		Care giving (a)		Non-care giving (b)		D
	Mean	S.D.	Mean	S.D.	Mean	S.D.	a-b
Labor participation	0.702	0.457	0.759	0.428	0.693	0.461	0.066
Parent care	0.137	0.344					
<i>Education</i>							
Low-education	0.899	0.301	0.797	0.402	0.915	0.279	-0.118
Middle-education	0.087	0.282	0.167	0.373	0.074	0.262	0.093
High-education	0.014	0.118	0.036	0.187	0.010	0.102	0.026
Age	55.817	6.828	51.921	5.547	56.437	6.808	-4.516
<i>Health status</i>							
Poor	0.257	0.437	0.184	0.387	0.268	0.443	-0.084
Fair	0.512	0.500	0.536	0.499	0.508	0.500	0.028
Good	0.136	0.343	0.161	0.368	0.132	0.338	0.029
Very good	0.085	0.279	0.108	0.310	0.082	0.274	0.026
Excellent	0.011	0.102	0.012	0.108	0.010	0.101	0.002
Having spouse	0.913	0.282	0.945	0.228	0.908	0.289	0.037
Number of children	2.462	1.242	2.022	1.022	2.532	1.259	-0.510
Urban	0.201	0.401	0.287	0.453	0.188	0.391	0.099
Household income	8.778	0.888	8.957	0.916	8.749	0.880	0.208
Number of living parent	0.509	0.688	1.047	0.643	0.423	0.656	0.624
<i>Survey year</i>							
y2011	0.425	0.494	0.457	0.498	0.420	0.494	0.037
y2013	0.575	0.494	0.543	0.498	0.580	0.494	-0.037
Observation	8,656		1,187		7,449		

Source Calculated based on China Health and Retirement Longitudinal Study (CHARLS) 2011 and 2013

without sibling, the group with two or three siblings, and the group with four and more siblings are small.

Second, for the influence of other factors, based on the results of Model 2, (1) the probabilities of caring for parents are 29.9% and 27.1% points higher for middle and high education level groups, respectively, than for the low-education level group.

(2) The probability becomes greater with age. Concretely, as compared with women in the group aged 45–49, the probabilities of giving parent care are 35.4% and 59.4% points higher for groups where the women were aged 55–59 and 60–69, respectively. The difference in the probability of parent care giving for women aged 45–49 and 50–54 is small.

(3) As compared with the group with very poor health, the probability of caring for grandchildren is 12.1%, 12.1%, and 14.3% points higher for the fair, good, and

Table 3.2 Determinants of women's parent care giving

	(1) Probit		(2) RE probit	
	dy/dx	z-value	dy/dx	z-value
<i>Education (low)</i>				
Middle-education	0.051***	4.09	0.299***	3.96
High-education	0.051*	1.88	0.271*	1.68
<i>Age (age 45–49)</i>				
Age 50–54	−0.005	−0.57	−0.041	−0.72
Age 55–59	−0.047***	−5.59	−0.354***	−5.49
Age 60–69	−0.079***	−8.29	−0.594***	−7.89
<i>Health status (poor)</i>				
Fair	0.018**	2.17	0.121**	2.13
Good	0.020*	1.72	0.121*	1.61
Very good	0.022	1.60	0.143*	1.67
Excellent	0.027	0.81	0.150	0.75
Having spouse	0.012	0.92	0.089	0.97
Children number	−0.011***	−3.17	−0.071***	−3.10
Income	0.009**	2.34	0.063**	2.33
Urban	0.022**	2.35	0.139**	2.24
Number of living parent	0.094***	19.95	0.619***	16.03
<i>Number of siblings (four and more)</i>				
No sibling	−0.001	−0.04	−0.017	−0.13
One	−0.025**	−1.97	−0.191**	−2.04
Two	0.006	0.55	0.031	0.46
Three	0.006	0.77	0.043	0.78
<i>Survey year (y2011)</i>				
y2013	−0.022***	−3.20	−0.146***	−3.33
Number of obs.	8,656		8,656	
Number of groups			6,635	
Likelihood-ratio test of $\rho = 0$			chibar2(01) = 27.88	
Pseudo R_2	0.151			
Prob $\geq \chi^2(\text{chibar2})$	0.000		0.000	

Source Calculated based on China Health and Retirement Longitudinal Study (CHARLS) 2011 and 2013

Notes *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

very good health groups, respectively. This indicates that health status positively affects the probability of caring for a parent.

(4) The number of children negatively influences the probability of giving parent care. When the number of children increases by one child, the probability of giving parent care decreases by 7.1% points. Because the time constraint remains, when the other time is consistent, a trade-off relationship exists between child care and parent care. Hours of housework may be greater for women with more children, which may decrease the time available to care for parents.

(5) Household income positively affects the probability of giving parent care. A woman in a high-income household may not need to work for a living; therefore, she may have more leisure hours to devote to parent care.

(6) The probability of giving parent care is 13.9% points higher for urban *hukou* women than for rural *hukou* women.

The results can be considered as follows. First, in rural areas, the influence of Confucianism is greater. Based on the culture in rural areas, the objects of parent care are mainly a woman's parents in law. However, in urban areas, a woman can care for both her parents and parents in law. In addition, the consciousness of intra-household or community risk sharing is more significant in rural areas than in urban areas. Therefore, parent care giving can be shared by other family members or the community in rural areas. Second, as mentioned above, depending on the public pension scheme covering employees in government organizations and firms—most of which are urban *hukou* workers—the mandatory retirement age is 50 for female workers and 55 for female cadres; most retired urban *hukou* workers can obtain pension benefits from the Urban Employee Pension Insurance scheme (UEPI) and most urban residents who are not covered by the UEPI can obtain pension benefit from the Urban Residents Pension Insurance (URPI). In rural areas, based on the New Rural Pension Scheme (NRPS), women aged 60 and over can receive pension benefits when an adult family member has participated in the NRPS. However, the pension benefit is less for rural *hukou* residents than for urban *hukou* residents.⁶ It can be assumed that rural women may have to work for a living. Thus, the probability of giving parent care is higher for urban women than for rural women.

The results indicate that the number of parents living, number of siblings, and individual characteristics such as education, age, health status, family structure (number of children, household income), and labor market segmentation factors (urban or rural areas) may influence the probability of caring for a parent.

3.4.2 Parent Care Giving and Women's Employment

Table 3.3 displays the results using the total samples of women and men. We summarize the results of the probit regression model (Model 1), IV-2SPS (Model 2), IV-2SRI (Model 3), random effects (RE) probit regression model (Model 4), and RE and IV-2SRI model (Model 5). We use the number of parents living and number of siblings as the instrumental variables for the endogenous variable of parent care

Table 3.3 Parent care giving and employment of women aged 45–69 years

	(1) Probit		(2) IV (2SPS)		(3) IV (2SRI)		(4) RE		(5) RE and IV(2SRI)	
	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value
Parent care	0.046***	2.98	0.225***	3.73	0.190***	3.80	0.202**	2.51	1.356***	4.07
<i>Education (low)</i>										
Middle-education	-0.019	-0.96	-0.036*	-1.78	-0.036*	-1.78	-0.136	-1.29	-0.240**	-2.16
High-education	0.185***	5.41	0.176***	4.90	0.175	4.89	1.229***	4.82	1.119***	4.27
<i>Age (age 45–49)</i>										
Age 50–54	-0.125***	-7.23	-0.112***	-6.35	-0.112***	-6.37	-0.567***	-6.67	-0.499***	-5.73
Age 55–59	-0.180***	-10.8	-0.157***	-8.62	-0.156***	-8.59	-0.870***	-9.79	-0.740***	-7.78
Age 60–69	-0.275***	-16.9	-0.237***	-12.30	-0.237***	-12.29	-1.319***	-13.83	-1.110***	-10.49
<i>Health status (very poor)</i>										
Fair	0.098***	8.11	0.094***	7.71	0.094***	7.70	0.452***	7.20	0.430***	6.76
Good	0.111***	7.01	0.105***	6.57	0.105***	6.56	0.555***	6.24	0.521***	5.78
Very good	0.098***	5.27	0.092***	4.87	0.092***	4.86	0.483***	4.67	0.446***	4.25
Excellent	0.077*	1.63	0.074	1.56	0.075	1.57	0.381	1.47	0.367	1.41
Having spouse	0.076***	4.18	0.072***	3.96	0.072***	3.96	0.368***	3.91	0.349***	3.65
Children number	-0.002	-0.54	-0.001	-0.29	-0.001	-0.26	-0.008	-0.34	0.001	0.05
Urban	-0.398***	-25.93	-0.403***	-25.84	-0.404***	-25.86	-1.824***	-17.96	-1.867***	-17.79
Income	-0.048***	-7.84	-0.051***	-8.14	-0.051***	-8.16	-0.202***	-6.33	-0.217***	-6.70
Residual items					-0.193***	-3.12			-1.215***	-3.58
<i>Survey year (2011)</i>										
y2013	0.040***	3.76	0.045***	4.18	0.045***	4.17	0.171***	3.59	0.200***	4.10

(continued)

Table 3.3 (continued)

	(1) Probit		(2) IV (2SPS)		(3) IV (2SRI)		(4) RE		(5) RE and IV(2SRI)	
	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value	Coef.	z-value
Number of obs.	8,555		8,555		8,555		8,555		8,555	
Number of groups							6,597		6,546	
Likelihood-ratio test of $\rho = 0$							chibar2(01) = 321.92		chibar2(01) = 322.19	
Prob $\geq$ chibar2							0.000		0.000	
Pseudo R_2	0.147		0.146		0.146					
Prob $\geq$ chi2	0.000		0.000		0.000					
Cragg-Donald Wald F-test			103.58 (P = 0.000)		185.54 (P = 0.000)				280.46 (P = 0.000)	
Sargan statistic			3.776 (P = 0.437)		3.985 (P = 0.408)				4.986 (P = 0.336)	
Durbin-Wu-Hausman			1.535 (P = 0.215)		31.869 (P = 0.000)				34.824 (P = 0.000)	

Source: Calculated based on China Health and Retirement Longitudinal Study (CHARLS) 2011 and 2013

Notes: (1) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

(2) Probit regression models are used. 2SPS: two-stage predictor substitution instrumental variables methods; 2SRI: two-stage residual inclusion instrumental variables methods; RE: random effects model

giving in the first stage estimation, which is shown in Table 3.2. The values of the Cragg-Donald Wald F-test are 103.57, 185.54, and 280.46 for IV-2SPS (Model 2), IV-2SRI (Model 3), and RE and IV-2SRI (Model 5) models, respectively, which are larger than the standard value of 10 and statistically significant at the 1% level. The results indicate that these are not weak instrumental variables. The results of the Durbin-Wu-Hausman test show that giving parent care is an endogenous variable in the probability of the labor force participation function. The Sargan statistic values suggest that the instrumental variables in the first stage are exogenous. These results indicate that the instrumental variables are valid, and the IV method should be used in estimations. The main findings are summarized as follows.

First, the probability of employment is 4.6–135.6% points higher for parent care giver group. In addition, when considering the heterogeneity and other endogeneity problem, the influence of parent care giving on the employment of women aged 45–69 years becomes greater. When these problems are not addressed, the results of the influence of parent care may be underestimated.

Second, other factors influence the employment of middle-aged women. Concretely, based on the results of Model 5 (RE and IV-2SRI model), (1) to compare with the group with low-level educations, the probability of work participation is lower for the mid-level educational group, but is higher for the high-level educational group. It is shown that U-shaped relationship exists between education and the employment of women aged 45–69.

The reason is thought to be as follows. Women with low-level educations have to work for a living, due to their lower household income; therefore, the probability of participation in work is higher for the low-level education group than for the mid-level education group. Because market wages are higher for the highly educated group, the probability of work participation may be higher for the high-level education group than for the low- and mid-level education groups.

Third, the probability of participation in work is higher for women aged 45–49 than for women aged 50 and older. This is related to the mandatory retirement system in government organizations and firms. Most women retire at 50 and 55 years; therefore, the probability of work participation may decrease dramatically for the group aged 50 and older.

Fourth, the probability of participation in work is higher for the healthy group than for the poor health group. As one kind of human capital, health status may affect the employment of middle-aged and older women. The health results are consistent with those of previous studies.

Fifth, the probability of participation in work is higher for women with a spouse (the married women group) than for single women.

Sixth, household income negatively affects women's work participation. Based on the individual utility model, unearned income, such as the household income of other family members, may increase the preference for leisure; therefore, the probability of work participation is lower for women in high-income households than for those in low-income households.

Seventh, the probability of participation in work is lower for urban women than for rural women. These results can be explained as follows. Because the public pension

benefit is higher for urban women than for rural women, most urban women can maintain their living standard by receiving public pension benefits after they retire, while most rural women must continue working for a living. In addition, most urban women are employees, and the proportion of workers whose ages are older than the mandatory retirement age is small in firms, which may be caused by the reasons of both labor supply and labor demand sides. From the labor demand perspective, although urban women may wish to work after retirement, the labor demand for older workers in firms is low in urban areas. On the contrary, in rural areas, most women work in the agricultural industry and are self-employed, so they can adjust their own work. Thus the labor demand for rural women may not change greatly in the middle-aged group and older group. In additions, from the labor supply perspective, the public pension benefit is higher for urban residents than rural residents, the higher pension benefits may rise the reservation wage level for urban women.

3.4.3 *Sensitivity and Robustness Checks: Results for Different Groups*

To consider the heterogeneity of different groups, we employ estimations using the RE or RE_IV-2SRI probit regression models by age, area (urban and rural), education, and household income groups. The validity model used is based on the likelihood-ratio test of $\rho = 0$, the Cragg-Donald Wald F-test, the Sargan statistic test, and the Durbin-Wu-Hausman test. The marginal values (dy/dx) of the parent care giving dummy variable and estimated residual items are summarized in Tables 3.4, 3.5, 3.6, 3.7. The main results are as follows:

First, the results of Table 3.4 show that the influence of parent care giving on employment is greater for women aged 50–59 than for women aged 45–49, and all values are positive. This suggests that to compare women aged 45–49 with women aged 50–59, the positive effects of parent care giving on employment are greater than the negative effects. This indicates that women aged 50–59 seem likely to participate in work to obtain higher incomes for living or to pay for parent care.

Second, the difference in the influence of parent care giving on employment is small between the urban *hukou* and rural *hukou* groups, and the influence is positive for both urban (1.313) and rural women (1.003) (see Table 3.5). It indicates that either the urban *hukou* group or the rural *hukou* group has to work to obtain more income from the labor market, therefore the problems of family-work conflict might maintain for both the rural and the urban residents.

Third, the probability of employment is higher for the mid-level and highly educated groups (1.732) than for the low-level education group (1.083) (see Table 3.6). These results can be explained by the human capital theory (Becker 1964; Mincer 1974). Well-educated individuals can obtain higher wages from the labor market when the reservation wage and work or leisure preference are constant; based on the individual utility maximum model, the probability of employment may

Table 3.4 Parent care and employment of women aged 45–69 by age

	(1) Age 45–49			(2) Age 50–54			(3) Age 55–59			(4) Age 60–69		
	RE			RE and IV(2SRI)			RE and IV(2SRI)			RE		
	dy/dx	z-value		dy/dx	z-value		dy/dx	z-value		dy/dx	z-value	
Parent care	0.378**	2.24		1.087*	0.076		3.073**	1.97		0.234	1.12	
Control variables	Yes			Yes			Yes			Yes		
Number of obs.	2,131			1,666			1,987			2,790		
Number of groups	1,800			1,471			1,700			6,422		
Likelihood-ratio test of $\rho = 0$	chibar2(01) = 55.61			chibar2(01) = 36.49			chibar2(01) = 52.87			chibar2(01) = 26.36		
Prob $\geq$ chi2(chibar2)	0.000			0.000			0.000			0.000		
Cragg-Donald Wald F-test	16.952 (P = 0.000)			652.340 (P = 0.000)			450.836 (P = 0.000)			213.815 (P = 0.000)		
Sargan statistic	7.166 (p = 0.1274)			8.918 (p = 0.063)			1.205 (p = 0.877)			1.904 (p = 0.754)		
Durbin-Wu-Hausman	0.304 (p = 0.581)			4.272 (p = 0.039)			6.332 (p = 0.012)			0.576 (p = 0.448)		

Source Calculated based on China Health and Retirement Longitudinal Study (CHARLS) 2011 and 2013
Notes (1) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$
(2) Education, marital status, health status, income, urban/rural status, and survey year variables are estimated. They are not expressed in this table
(3) Probit regression models are used. 2SRI: two-stage residual inclusion instrumental variables method; RE: random effects model

Table 3.5 Parent care and employment of women aged 45–69 by urban *hukou* and rural *hukou*

	(1) Urban		(2) Rural	
	RE and IV(2SRI)		RE and IV(2SRI)	
	dy/dx	z-value	dy/dx	z-value
Parent care	1.313**	2.13	1.003**	2.48
Control variables	Yes		Yes	
Number of obs.	6,335		5,850	
Number of groups	4,903		4,564	
Prob $\geq$ chi2 (chibar2)	0.000		0.000	
Cragg-Donald Wald F-test	349.668 (P = 0.000)		620.356 (P = 0.000)	
Sargan statistic	6.980 (p = 0.137)		1.902 (p = 0.754)	
Durbin-Wu-Hausman	39.838 (p = 0.000)		15.863 (p = 0.000)	

Source Calculated based on China Health and Retirement Longitudinal Study (CHARLS) 2011 and 2013

Notes (1) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

(2) Education, age, marital status, health status, income, and survey year variables are estimated. They are not expressed in this table

(3) Probit regression models are used. 2SRI: two-stage residual inclusion instrumental variables method; RE: random effects model

Table 3.6 Parent care and employment of women aged 45–69 by education

	(1) Low		(2) Middle and high	
	RE and IV(2SRI)		RE and IV(2SRI)	
	dy/dx	z-value	dy/dx	z-value
Parent care	1.083***	2.87	1.732**	2.32
Control variables	Yes		Yes	
Number of obs.	7,690		865	
Number of groups	5,876		670	
Likelihood-ratio test of rho = 0	chibar2(01) = 282.44		chibar2(01) = 32.53	
Prob $\geq$ chi2(chibar2)	0.000		0.000	
Cragg-Donald Wald F-test	150.662 (P = 0.000)		833.660 (P = 0.000)	
Sargan statistic	2.402 (P = 0.662)		6.663 (P = 0.155)	
Durbin-Wu-Hausman	38.174 (p = 0.000)		21.044 (p = 0.000)	

Source Calculated based on China Health and Retirement Longitudinal Study (CHARLS) 2011 and 2013

Notes (1) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

(2) Age, marital status, health status, income, and survey year variables are estimated. They are not expressed in this table

(3) Probit regression models are used. 2SRI: two-stage residual inclusion instrumental variables method; RE: random effects model

Table 3.7 Parent care and employment of women aged 45–69 by household income

	(1) Low-income		(2) Middle-income		(3) High-income	
	RE		RE and IV(2SRI)		RE and IV(2SRI)	
	dy/dx	z-value	dy/dx	z-value	dy/dx	z-value
Parent care	0.415**	2.11	1.214	1.95	1.214	1.95
Control variables	Yes		Yes		Yes	
Number of obs.	2,665		2,876		3,034	
Number of groups	2,331		2,624		2,624	
Likelihood-ratio test of $\rho = 0$	chibar2(01) = 56.13		chibar2(01) = 32.53		chibar2(01) = 41.86	
Prob $\geq \chi^2(\text{chibar2})$	0.000		0.000		0.000	
Cragg-Donald Wald F-test	424.373 (P = 0.000)		537.265 (P = 0.000)		593.265 (P = 0.000)	
Sargan statistic	1.229 (P = 0.873)		5.068 (P = 0.280)		5.563 (P = 0.234)	
Durbin-Wu-Hausman	2.366 (p = 0.124)		4.048 (p = 0.044)		24.172 (p = 0.000)	

Source Calculated based on China Health and Retirement Longitudinal Study (CHARLS) 2011 and 2013

Notes (1) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

(2) Age of samples is from 45–59. (2) Education, age, marital status, health status, urban/rural status, and survey year variables are estimated. They are not expressed in this table

(3) Probit regression models are used. 2SRI: two-stage residual inclusion instrumental variables method; RE: random effects model

be higher for well-educated women (positive effect). On the contrary, well-educated women may obtain more pension benefits than less-educated women, and increasing unearned income may decrease the probability of employment for well-educated women aged 45–69 (negative effect). The estimated results suggest that the positive effect is greater than the negative effect for well-educated women.

Fourth, the influences of parent care on employment are not statistically significant for both middle-income and high-income groups, whereas parent care positively affects the probability for the low-income group (Table 3.7). It might be caused by that an individual in the low-income group has to work for living or to pay for parent care. In the sense, the problem of family-work conflict might be severe for the low-income group than the middle- and high-income groups in China.

3.5 Conclusions

Using the longitudinal survey data of the China Health and Retirement Longitudinal Survey (CHARLS) from 2011–2013, this study investigates the influence of parent care giving on employment of women aged 45–69 in China. The random effects (RE) model and instrumental variables (IV) methods are used to address the unobserved

heterogeneity and other endogeneity problems, respectively. The main findings are as follows.

First, the number of parents living, number of siblings, and individual characteristics such as education, age, health status, family structure (number of children, household income), and labor market segmentation factors (urban or rural areas) may influence the probability of parent care giving for middle-aged and older women.

Second, although the results of previous studies using younger and middle-aged women (i.e., women aged 18–52) indicated that parent care giving negatively affects women's employment, this study focused on middle-aged and older women aged 45–69 and found that the probability of employment is higher for the group caring for parents. This can be explained by the fact that the positive effect (income effect) is higher than the negative effect (time constraint effect).

Third, the influences of caring for parents on women's employment differ by group. Concretely, the influence is greater for women aged 50–59, those who are well-educated, and low-income women than for their counterparts. In the sense, the problem of family-work conflict by the parent care might be severe for these groups.

The policy implications of these results can be considered to be as follows. First, although middle-aged and older women can choose to exit the labor market to live depending on the public pension benefit and past savings, most women who are caring for parents chose to work. It is assumed that these parent care givers must work to earn a living because the pension benefits are lower or they are trying to obtain more income from the labor market for living or to pay for parent care. This suggests that the work–family conflict caused by the parent care among the middle-aged and the older women may remain. To address the problem, elderly care insurance policies should be considered. The case in Japan, where a care insurance system was implemented in 2000, shows that implementing a care insurance system positively affects the labor supply of Japanese women (Shimizutani et al. 2004). The Chinese government may learn from the experience of developed countries to establish a care insurance system in the future. Second, the results show that low-income women are likely to have to work. This suggests that income inequality may cause differences in the labor force participation of middle-aged and older women; poor women must work endlessly, which may cause the gaps of work status in lifespan among groups of women. To address the problem, income inequality should be considered in the care insurance system. For example, the contribution of care insurance should be paid based on wage or income levels, and basic care service should be equal for low-income and high-income groups.

Notes

1. For empirical studies on the child care on women's employment in China, please refer to Shen et al. (2012); and Liu et al. (2016).
2. For the latest paper on the summary and discussion on family care in China, please refer to Connelly et al. (2018).
3. Low education includes those with no formal education, those who did not finish primary school, those who were home schooled, and those who completed

- elementary school; middle education includes those with junior high school, senior high school, or vocational school educations; high education includes those with college, university, or graduate school educations.
4. The age dummy variables include those 45–49, 50–54, 55–59, and 60–69 years of age.
 5. Based on the CHARLS questionnaire, five kinds of dummy variables (excellent, very good, good, fair, and poor) were constructed.
 6. For example, based on the data from CHARLS2015, the average annual public pension benefit is 27,543 CNY for urban residents and 2,705 CNY for rural residents.

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